Vehicle Rear Signal Recognition

Introduction

Effective vehicle rear signal recognition enhances road safety and autonomous vehicle technology. Your efforts in this challenge contribute to the advancement of intelligent transportation systems.

Objective: Develop a robust model to accurately classify each image sequence's rear signal state. This involves recognizing the status of brake lights and turn signals and addressing the intricacies of different real-world road conditions.

The dataset provided consists of time-sequence images capturing the rears of vehicles across diverse real-world road conditions. Each image frame is manually cropped from raw video, presenting a snapshot of the vehicle's rear.

Hsu, Han-Kai, et al. "Learning to tell brake and turn signals in videos using CNN-LSTM structure." *2017 IEEE 20th International Conference on Intelligent Transportation Systems (ITSC)*. IEEE, 2017.

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Dataset Overview

Labeling Convention

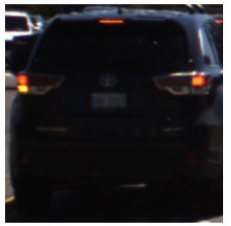
The sequences are categorized based on the status of the rear lights, specifically the brake and turn signals:

- Each state is denoted by 3 letters: B (brake), L (left), and R (right).
- Signals are represented as the corresponding letter (when on) or O (when off).


OOO


BOO


OLO


BLO


OOR


BOR

Classes

This states lead to 6 different classes:

- **OOO**: Brake light and turn signals off
- **BOO**: Brake light on, turn signals off
- **OLO**: Brake light off, left signal on
- **BLO**: Brake light on, left signal on
- **OOR**: Brake light off, right signal on
- **BOR**: Brake light on, right signal on

Dataset Link: http://vllab1.ucmerced.edu/~hhsu22/rear_signal/rear_signal#
(click on Download)

The downloaded dataset has a more complex structure that is beyond the scope of this challenge. Therefore, a Python script was prepared to extract the subset of data required for this task. (downloadable from the course page)

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Evaluation Metrics

The challenge will be evaluated primarily on your oral presentation.

But... to give you a chance to challenge yourself, there is **1 extra point** ready to be awarded to you:

It is sufficient to exceed all of the following ***recall per class*** values:

OOO	BOO	OLO	BLO	OOR	BOR
0.78	0.67	0.15	0.2	0.15	0.2

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Further Information

Constrain:

- To avoid inserting bias, no vehicle in the test set should overlap with the training or validation sets (you will already have one vehicle per folder after running the *subset extraction code*).

You will have to deliver:

- An analytical table of the performances evaluated;
- The commented code;
- A file containing all the instructions for running the code either in cross-validation mode (if any) or simply for testing (a Jupyter notebook is also fine);
- PowerPoint presentation of the pitch presentation of the adopted solution (pitch duration 7 minutes + questions).

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